

IN THE DRAWINGS:

Enclosed herein is a replacement sheet for Fig. 2.

## REMARKS

Applicant has amended the Claim 1, cancelled Claim 3 without prejudice, and submits a replacement sheet for the Fig. 2. Applicant respectfully submits that these amendments to the claims and the drawings are supported by the application as originally filed and do not contain any new matter. Therefore, the Office Action will be discussed in terms of the claims and drawings as amended.

The Examiner has objected to the drawings, pointing out an informality in the Fig. 2. Submitted herewith is a replacement sheet correcting the informalities in Fig. 2. Therefore, Applicant respectfully requests that the Examiner withdraw his objection.

The Examiner has rejected the Claims 1, 2, 6, and 7 under 35 U.S.C. 102 as being anticipated by Hatfield, et al. or in the alternative under 35 U.S.C. 103 as being obvious over Hatfield, et al. in view of any one of Pesque, et al. or Kamiyama, et al. or Kajiwara, et al., stating that Hatfield, et al. is directed to formation of a projection image with reduced speckle artifact which represents a selected view from 3D volumetric data chosen to encompass a region of interest, in context of vascular studies where B-mode intensity which essentially shows all of the elements of the present invention; or in the alternative, Hatfield, et al. confines inversion discussion to intensity mode pixel values; Pesque, et al. teaches inverting transfer functions of blood flow AB projective rather than tissue; Kamiyama, et al. notes that when contrast agents are injected, blood within vessels become more echogenic than tissue, and therefore “reverse inversion” must be practiced; or in the alternative still, Kajiwara, et al. at Fig. 8, element 42 inverts at least, the B-mode pixel intensify data to better differentiate stationary from moving structures; and it would have been obvious to modify Hatfield, et al. as suggested by Pesque, et al., Kamiyama, et al., or Kajiwara, et al.

Applicant has carefully reviewed Hatfield, et al., and respectfully submits that contrary to the Examiner’s position, Hatfield, et al. at column 2, line 13 indicates that the discussion concerns only a two-dimensional image, and a reading of the other citations to Hatfield, et al. by the Examiner indicates that they only discuss transformation of the intensity, velocity, and power, but not inversion.

Applicant has further carefully reviewed Pesque, et al., and respectfully submits that at column 2, lines 4-13, it discusses a 3D power Doppler image and overlapping of the pixels to distinguish the elements. Also, Applicant respectfully submits that at column 8, lines 41-45, it discusses inverting the transfer function outputs in Figs. 6 and 7, and applying these to a gate

circuit so as to separate the blood flow and tissue images. Accordingly, Applicant respectfully submits that Pesque, et al. does not disclose inverting the brightness value of each voxel of three-dimensional image data.

Applicant has also carefully reviewed Kamiyama, et al. and respectfully submits that at column 2, line 59 through column 3, line 29, it teaches that one would turn down the intensity to utilize a minimum intensity projection technique. Still further, Applicant respectfully submits that while Kamiyama, et al. may teach other intensity projection methods, but these are not binary methods. Applicant respectfully submits that a binarization of the brightness value is advantageous over methods such as in Kamiyama, et al. because for display of a cavity portion, such as a cardiac cavity, reversal of brightness data of a gray scale of pixels results in enhanced brightness at the cavity portion image. However, which part within the cavity is actually displayed, or given a maximum brightness, is unknown. Thus, there may be a problem in such methods that, for example, the display portion of a cavity may be a near side of a certain portion of the cavity and another display portion may be a further side of another portion. As a result, an accurate 3D display is not possible with the method of Kamiyama, et al. In contrast thereto, Applicant's invention utilizes binarization in which most of the pixels for the cavity portion are given the maximum brightness. As a result, the wall on the near side along a view is displayed with maximum brightness, and the confusion in the image which results from a method such as in Kamiyama, et al. does not occur. Therefore, an accurate 3D display is possible with the binarization of Applicant's invention.

Still further, Applicant has carefully reviewed Kajiwara, et al., and particularly Kajiwara, et al. at Fig. 8, and respectfully submits that element 42, which Fig. 8 appears to disclose as an inverter, is in fact upon reading the text at column 11, lines 19-28, merely a reversing circuit which changes the black portions to white portions and the white portions to black, so it becomes easier to recognize the overlap portion and in all of the manner that functions like the device of Fig. 7.

In view of the above analysis, Applicant respectfully submits that none of the art cited by the Examiner, namely, Hatfield, et al., Pesque, et al., Kajiwara, et al., or Kamiyama, et al. suggests which part of a cavity should be displayed in a 3D display, and none recognized that it is not always the wall on the nearer side that is shown in the 3D display employing a maximum intensity projection method and cannot achieve the advantage of Applicant's invention of accurately displaying the shape of the wall surface on the nearer side.

In view of the above, therefore, Applicant respectfully submits that the combination suggested by the Examiner is not Applicant's invention. Therefore, Applicant respectfully submits that the Claims 1, 2, 6, and 7 are not anticipated by Hatfield, et al., or in the alternative, not obvious over Hatfield, et al. in view of any of Pesque, et al., or Kamiyama, et al. or Kajiwara, et al.

The Examiner further rejects the Claim 3 under 35 U.S.C. 103 as being obvious over Hatfield, et al. in view of Pesque, et al., or Kamiyama, et al. or Kajiwara, et al., and further in view of Miyazaki, et al. and Iizuka, et al., stating that while Hatfield, et al., Pesque, et al., Kamiyama, et al., and Kajiwara, et al. are all silent as to binarization; Miyazaki, et al. and Iizuka, et al. disclose binarization; and it would have been obvious to one of ordinary skill in the art to modify the combination of Hatfield, et al. in view of any one of Pesque, et al. or Kamiyama, et al. or Kajiwara, et al. in view of the teachings of Iizuka, et al. or Miyazaki, et al.

In reply thereto, Applicant would like to incorporate by reference his comments above his comments concerning Hatfield, et al., Pesque, et al., Kamiyama, et al., Kajiwara, et al., and Applicant's invention. Still further, Applicant has carefully reviewed both Miyazaki, et al. and Iizuka, et al. and respectfully submits that both merely teach a technique for binarization of a brightness value of a 2D image. Applicant respectfully submits that a 3D image is substantially more complex and different than a 2D image, and the binarization of the brightness value of a 2D image would not suggest binarization of a 3D image.

In view of the above, therefore, Applicant respectfully submits that the combination of Miyazaki, et al. or Iizuka, et al. with the references previously applied by the Examiner, would not be Applicant's invention since Iizuka, et al. or Miyazaki, et al. merely teach the 2D binarization, and one of ordinary skill in the art would not be suggested to utilize 3D binarization. Therefore, Applicant respectfully submits that the combination suggested by the Examiner is not Applicant's invention nor suggested to one of ordinary skill in the art. Therefore, Applicant respectfully submits that the Claims 1, 6, and 7 are not obvious over Hatfield, et al. in view of any of Pesque, et al. or Kamiyama, et al. or Kajiwara, et al. taken together with Iizuka, et al. or Miyazaki, et al.

The Examiner has rejected the Claims 4 –7 under 35 U.S.C. 103 as being obvious over Hatfield, et al. taken in conjunction with any one of Pesque, et al. or Kamiyama, et al. or Kajiwara, et al., and further in view of Prater, et al., stating that the combination applied against Claim 1 is silent as to the use of the isolated cardiac cavity or vessel region for quantitations, and

it would have been obvious in view of Prater, et al. to use the results of a segmentation or regional chamber delineation to determine for example ejection fraction defined as left ventricular volume changes during heart contraction or other values of interest to the cardiologist for diagnosis.

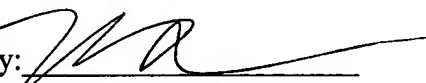
In reply thereto, Applicant would like to incorporate by reference his comments above concerning Applicant's invention and Hatfield, et al., Pesque, et al., Kajiwarra, et al., Kamiyama, et al., Iizuka, et al., and Miyazaki, et al. In addition, Applicant has carefully reviewed Prater, et al., and respectfully submits that Prater, et al. performs its function by classifying the pixels as either a fluid pixel or a tissue pixel, and calculates the volume based on the area of the fluid pixel within each segment of the region of interest, and therefore does not disclose or suggest a method and apparatus for determining the volume of a fluid filled body cavity in real time from an ultrasonic image.

In view of the above, therefore, Applicant respectfully submits that the Claims 4-7 are not obvious over the art cited by the Examiner.


In view of the above, therefore, Applicant respectfully requests that this amendment be entered, favorably considered, and the case passed to issue.

Please charge any additional costs incurred by or in order to implement this amendment or required by any requests for extensions of time to KODA & ANDROLIA DEPOSIT ACCOUNT NO. 11-1445.

Respectfully submitted,  
KODA & ANDROLIA

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